

AMENDMENTS TO THE CLAIMS

5 Claim 1 (Currently amended) An extrusion-free wet cleaning process for post-etch
Cu-dual damascene structures, the process comprising:
providing a wafer comprising a silicon substrate and at least one post-etch Cu-dual
damascene structure, the post-etch Cu-dual damascene structure having a via
structure exposing a portion of a Cu wiring line electrically connected with an
10 N^+ diffusion region of the silicon substrate and a trench structure formed on the
via structure;
executing an oxidation step by applying a diluted H_2O_2 solution to the wafer to
slightly oxidize the surface of the exposed Cu wiring line; and
washing away cupric oxide generated in the oxidation step by means of a cupric
oxide cleaning solution containing diluted HF, NH_4F or NH_2OH having a pH of
15 above 7; and
~~preventing Cu reduction reactions on the N^+ diffusion region connected Cu wiring
line.~~

20 Claims 2-5 (Original)

Claim 6 (Currently amended) The process of claim 1 wherein the method of preventing
Cu reduction reactions on the Cu wiring line comprises reducing the H_2O_2
concentration of the diluted H_2O_2 solution to below 100:1 (v/v) of solvent to H_2O_2 .

25 Claim 7 (Original)

Claim 8 (Cancelled)

30 Claim 9 (Currently amended) A wet cleaning process comprising:
an oxidation step comprising a means for reducing Cu deposition on a cathode-like
copper wiring line of a Cu-dual damascene structure, wherein the means for
reducing Cu deposition on a cathode-like copper wiring line comprises a step of
purging an inert gas during the oxidation process; and
an oxide etch step for washing away cupric oxide generated in the oxidation step by
35 means of a cupric oxide cleaning solution; ~~and~~
~~reducing Cu deposition on a cathode-like copper wiring line of a Cu-dual
damascene structure.~~

40 Claims 10-13 (Original)

Claim 14 (Cancelled)

Claims 15 and 16 (Original)

Claim 17 (Currently amended) The process of claim 9 wherein the process of reducing Cu deposition on a cathode-like copper wiring line comprises reducing the H_2O_2 concentration of the diluted H_2O_2 solution to below 100:1 (v/v) of solvent to H_2O_2 .

5 Claims 18 and 19 (Original)